

Improvements

In Process Efficiency

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HWRIC
Technology
Update

Waste Reduction in Metal Fabrication

Water-Based Cleaners

Water-based cleaners are beginning to replace solvent degreasers in numerous industrial surface preparation operations. Many metal fabricators nationwide currently use aqueous cleaners for degreasing and coating metal. The water-based cleaners effectively remove protective oils, coolants, lubricants, and dirt from manufactured metal parts. Special additives such as phosphating agents also make the aqueous cleaners versatile coating solutions for corrosion protection or pre-paint applications.

Waste Generation

Making the switch from solvents to aqueous cleaners can reduce VOC emissions, improve worker safety, and eliminate the generation of hazardous organic solvent waste; but the use of aqueous cleaners can create a waste disposal problem of its own. Conventional aqueous cleaning baths are only capable of effectively operating for a limited period of time before needing replacement due to the build-up of oil and dirt in the bath. Depending upon the toxic nature of the spent bath solution, treatment or disposal costs can be significant and compounded by the costs associated with lost production time and replacement of raw materials.

Ultrafiltration Case Study

HWRIC's Pollution Prevention Team assisted R.B. White, Inc., a metal fabricator, in finding an environmentally responsible way to cut back on waste disposal costs for its aqueous cleaners. The Bloomington, Illinois metal fabricator had been paying \$15,000 per year to periodically dump and replace its 5000-gallon aqueous degreasing/phosphating bath in order to maintain product quality, meet wastewater discharge limits, and comply with hazardous waste disposal regulations. HWRIC evaluated a range of options and conducted bench and pilot-scale laboratory tests to develop the best waste reduction strategy.

R.B. White implemented HWRIC's innovative pollution prevention plan which incorporated a full-scale ultrafiltration system directly into the facility's degreasing/phosphating process. Ultrafiltration is a pressure-driven membrane filtration technique capable of producing a high quality filtrate from wastewater. HWRIC staff trained plant personnel to use ultrafiltration which extended the production life of the bath and eliminated the need for frequent dumping and replacement.

In the full-scale study, ultrafiltration was able to continuously remove oil and dirt from the bath and return filtered solution and raw materials back to the original process for reuse. By keeping the bath clean, ultrafiltration improved productivity and product quality, saved money in raw material and disposal costs, and eliminated thousands of gallons of industrial process waste each year. As of this writing, the same bath has been in use for 19 months. Ultrafiltration brought about a 99% reduction in waste generation and had a payback period of only seven months.

Because of its unique capabilities to concentrate wastewater and produce a clear filtrate, ultrafiltration is emerging as a promising technology for extending the life of aqueous cleaners. Other promising industrial applications include reducing the volume of waste machining coolants and dye lubricants. Ultrafiltration does not require a stockpile of chemicals like other chemical treatment methods. Instead, ultrafiltration produces a water phase suitable for reuse and a concentrated phase that is only a fraction of the original volume.

For further information on the potential applicability of ultrafiltration to your processes contact:

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How HWRIC Can Help:

- X Engineering Problems
- X On-site Assessment
- X Regulatory Compliance
- X Training
- X Case Studies
- X Waste Reduction Options
- X Matching Funds for Research
- X Information Services
- X Improved Productivity, Process Efficiency and Cost Accounting